Brush Wellman: A diamond in the rough

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By Derin Phelps

The Topaz Mountains of Juab County, which lie about 45 miles northwest of Delta, hold one of the world's few known supplies of one of the strongest, yet lightest, metals. The Brush Beryllium Company started mining bertrandite ore there in early 1969. The ore is milled so beryllium metal can be gleaned from it.

Now known as Brush Wellman, the mill, located on U.S. Highway 6 at Brush [illegible] an Rd., and the mine, located 47 [illegible] west of the mill on Brush Wellman Rd., will celebrate its 30th anniversary operating in Millard and Juab Counties in September.

"Preliminary work began in the mine, I understand, in April of 1968," said Don McMillan, Brush Wellman Director of Utah Operations.

According to Brush Wellman Mine Manager Greg Hawkins, Professor Norm Williams of the University of Utah knew of fluorite and uranium deposits in the area of the Topaz Mountains. He also knew, through his geologic background, that beryllium occurs in those kinds of mineral suites.

"He came out and looked in this area, and was able to identify some of the beryllium mineralization," Hawkins said.

"[illegible]e was a literal land rush over 30 [illegible] ago to stake claims in this area, much like the gold rush days in the California and Nevada areas, but on a smaller scale."

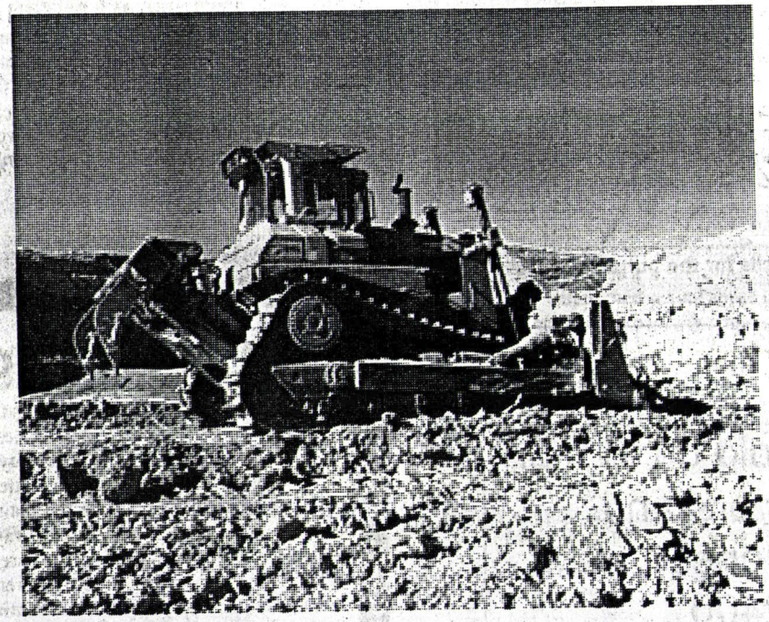
Over the years, Brush Wellman has been able to acquire most of the beryllium properties in the West Desert. Brush Wellman also imports beryl ore from countries like Brazil and China. Beryllium is gleaned from both ores and then mixed together at the mill before being shipped to Brush Wellman's plant in Elmore, Ohio for further processing.

"The imported beryl ore is derived as a by-product of Feldspar Mining," Hawkins explained. "We get the reject beryl rock after the Brazilians and Chinese separate out the good, quality gems."

Hawkins explained that 10% to 20% of Brush Wellman's process involves beryl ore. The rest uses bertrandite ore. To get to the beryllium, the ores have to be reduced and digested into a blended, clear liquid before the final product, called Beryllium Hydroxide, can be shipped. Hawkins said it takes more energy and milling to convert the high grade beryl ore to liquid than the lower grade bertrandite ore.

The bertrandite ore was formed in ancient times when hydrothermal flows of saturated solution flowed into volcanic ashes that historically spewed into the air and formed geologic tuff layers near the crust of the earth. Tuff is found anywhere from 1-1,000 feet under the surface. The tuff is what miners dig through to get to the bertrandite. Since tuff is glass like, it's very porus, so water can pass through it easily. Hawkins explained that the bertrandite is so fine, it cannot be seen with the naked eye. Brush Wellman uses special instruments, called berylometers, to find it. Berylometers work somewhat in the reverse of a Geiger counter.

Miners in the pit take readings with field berylometers. They mark sample holes they drill with G.P.S. units that mark the spots by coordinating the location with satellites in orbit. This information is then placed into a computer, and maps of the mine are made. The berylometers can determine what grade the bertrandite ore is in 15 seconds. According to Carla Spadaro, Geo Tech at the mine, computer generated maps are used to tell heavy equipment operators where and how deep to mine.



Tractor scrapes the tuff for bertrandite ore at Brush Wellman's Topaz Mine.

According to Mine Tech Crandall Nielson, beryllium gives off neutrons when it's subjected to Gamma Rays. The berylometer measures the neutrons and determines how much beryllium is in the tuff being probed. The ore is not only examined in the mine pit. Nielson takes the samples into the mine lab and dries them. After samples are completely dry, Nielson puts them into an assay berylometer, which is a large lab berylometer that can give a more accurate determination of the amount of beryllium inside the ore than the field berylometer can do.

"BeO, actually, is what we assay for--Beryllium Oxide," Nielson said.

Each mine pit can have anywhere from 7,000 to 10,000 samples. Brush Wellman has identified more than 60 years of beryllium reserves in the Juab County West Desert. Such a large deposit of a mineral is unusual in the mining industry. The mine provides more than 60% of the world's beryllium.

"The open pit mine we have is the only commercial mine deposit of bertrandite in the world," McMillan said. "There's no other like it. It's the largest commercial operating deposit of beryllium on the face of the earth."

The area of the mine site is encompassed by federal mining claims and state mineral leases. Several thousand acres of land are under claims and leases. Brush Wellman pays annually $100 per claim to the BLM. State leases are various prices, depending on the surface area they cover.

A close-up view of freshly mined bertrandite ore. The texture is similar to wet clay.

Reclamation is high on Brush Wellman's priority list. One of the company's challenges is to get plants to grow in the high alkaline soil of the West Desert. Brush Wellman covers its mining areas with approximately six inches of topsoil and about eight varieties of native seeds when mining operations are completed. Hawkins said Brush Wellman staff have learned which species of plants will best survive in high sodium soil. The company has tested an extensive variety of plants and reclamation methods, and identified 8-12 major species that are very successful.

In the early 80s, the law demanded miners to reclaim any land they disturbed. Brush Wellman then began working with the Utah Division of Oil, Gas and Minerals and the BLM to establish reclamation efforts. They agreed to maintain a reclamation program that resulted in immediate phase reclamation of inactive mined areas.

"Part of what determines the success of a reclamation program is the quality of soil and the amount of moisture you get," Hawkins explained.

Brush Wellman has learned over the years

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Reclamation efforts provide this haven for natural plants and wildlife as seen by this kit fox.

Brush Mine

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that tuff does not grow plants well because of a high sodium content. The company used that information to change its reclamation procedures. One of the changes included use of a different type of topsoil. Brush Wellman now spreads the soil only six inches over a larger area. It used to spread 18 inches over a small area. Employees are finding that plants grow better this way. Brush Wellman adds fertilizers, gypsum and organic chemicals to bring the nutrient value of the soil up for plants.

"We are required by the State of Utah, in the reclamation plan, to achieve 70% of background growth within three years." Hawkins said. "In some recent reclaimed areas, we exceeded background growth by over 100% in three years."

Brush Wellman is bonded to complete reclamation of all completed mine areas. If, for some reason, the company is unable to reclaim an area, the bond will take over and reclamation will proceed.

Hawkins explained that reclamation not only helps plant life, but also helps wildlife. In and around the mine are several small ponds of water for wildlife to drink. One of the guards at the mine recently photographed a kit fox which had taken shelter in rocks in a recently reclaimed area.

Jack B. Kelley Company of Amarillo, Texas contracts with Brush Wellman to haul several 43 ton semi loads of bertrandite ore every day from the mine to the mill. The trucks are specially built so they do not damage the highway. Loads are covered with tarps to control dust. Brush Wellman Rd. started as a dirt road between the mill and the mine. The company and the State Department of Transportation worked out a deal with Millard and Juab Counties to asphalt the highway.

Brush Wellman can be found on the World Wide Web at www.brushwellmanutah.com. See next week's issue of the *Chronicle Progress* for the second part of this series on Brush Wellman. Next week's article will focus on the Brush Wellman mill near Delta.

Crandall Nielson tests bertrandite ore in large lab berylometer.

Carla Spadaro and Robert Lister use a field berylometer and GPS unit to test and map bertrandite ore samples at the Topaz Mine site.

Millard County Commission highlights